SUBJECT REQUIREMENT	LOCATION IN APPLICATION COMMENTS
PART E GROUNDWATER MONITORING **General Information Required For A Proposed Groundwater Monitoring Program** All land based units (landfills, surface impoundments, waste piles and land treatment) must have a groundwater monitoring program. On a case-by-case basis it may be warranted for a unit to be exempt from groundwater monitoring. This could be based on a no migration demonstration depending on the nature of the waste or the design of the unit. 34:060, Section 1(2). Facilities may monitor more than one unit with the same monitoring system. Section 8(2) Regardless of which groundwater monitoring program a particular unit is in, it will almost always be necessary to address the information required in items E-2, E-3, E-4, and E-5 when proposing a groundwater monitoring program to be included in a closure plan or a Part B permit. **E-1 Interim Status Groundwater Data** Interim status facilities that cannot "clean close" all of their "treatment, storage or disposal" (TSD) units generally must revise their closure plans to meet the Chapter 34 requirements and must afterwards submit a Part B application to obtain a Permit. Interim status facilities that want to continue to operate a TSD unit must also obtain a Part B Permit. Such facilities must include a summary of the applicable groundwater data obtained during the interim status period in their revised closure plan or Part B permit application. This summary may include the following: **Interim Status Monitoring Data** 401 KAR 38:100 • Description of wells • Description of the sampling/analysis procedures • Monitoring data • Statistical procedures • Information on the extent of contamination and the rate of migration **E-2 General Hydrogeologic Information** 401 KAR 38:090 Section 2(21) • Provide a discussion on subsidence (sinkhole collapse), if the facility is underlain by limestone (*i.e.*, is in a karst terrane) • Provide information on design of unit, if designed for no migration of wastes	

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• Provide a discussion on how subsidence (sinkhole collapse) will be monitored • Propose a spring survey and a dye trace and discuss karst drainage, if applicable **E-3** **<u>Topographic Map</u>** 401 KAR 38:100 Section 2(3) • Delineate the waste management areas • Show all relevant proposed and existing wells both on and off site • Show property boundaries **E-4** **<u>Contaminant Plume Description</u>** 401 KAR 38:100 Section 2(4) • Describe the characteristics of the plume, if applicable • Delineate the plume on a map • Identify the specific contaminants in the groundwater, if applicable (include maximum levels) • Show horizontal and vertical extent of plume, if applicable **E-5** **<u>General Groundwater Monitoring Requirements</u>** 401 KAR 34:060 Section 8 **E-5(a)** **<u>Description of Wells</u>** Section 8(1&3) • Describe the groundwater monitoring system • Provide diagrams showing the proposed well construction details (casing, screens, bentonite seals etc.) • Identify the uppermost aquifer and any aquifers hydraulically connected to it. (38:100 Section 2) **E-5(b)** **<u>Sampling and Analysis Procedures</u>** Section 8(4-7) • Identify and describe the procedures that will be used to collect the groundwater samples • Identify the procedures on how the samples will be preserved and handled (include chain of custody control) • Identify the parameters to be monitored and the (SW-846) test methods to be used • Propose taking a sequence of at least 4 independent samples at each well per sampling event or propose an alternate procedure • Identify how the groundwater elevations (water table) of the uppermost aquifer will be determined each time groundwater is sampled **E-5(c)** **<u>Procedures for Establishing Background</u>** Section 8(7) • Propose taking an adequate number of samples appropriate for the statistical test to be used	

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• Propose establishing background water quality from at least one well which is unaffected by the unit (ideally upgradient from the unit) for each constituent of concern **E-5(d) <u>Statistical Procedures</u>** Section 8(8 & 9) Note: Statistics may not be required for parameters which do not naturally occur and their standard is non-detect. • Propose to compare each constituent in each downgradient well to the background well • Propose a statistical test that will be appropriate for the data (distribution of parameters or constituents). Method may be contingent upon data (see the EPA *Guidance Document on the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, April 1989, PB89-151047 and the *Addendum* dated July 1992). **E-5(e) <u>Proposed Point of Compliance</u>** Section 6 • The proposed point of compliance must consist of the downgradient wells to be monitored. The point of compliance must also be capable of immediately detecting a release from the unit to the uppermost aquifer. **E-5(f) <u>General Requirements</u>** • Propose to determine the groundwater flow rate and direction at least annually. (34:060, Section 9(5)) • Identify the monitoring period (generally 30 years unless monitoring for clean closure, which is generally 2 years). (34:060, Section 7) • Discuss how records will be kept and reported. (34:050, Section 4) • Propose the frequency (usually semiannual) of monitoring events. (34:060, Section 9(4)) • Provide cost estimates for the proposed work. (34:080) • Provide schedule for implementing the proposed work. *** **<u>DETECTION MONITORING - COMPLIANCE MONITORING - CORRECTIVE ACTION MONITORING</u>** There are three distinct groundwater monitoring programs addressed in the 401 KAR 34:060 regulations: “detection” monitoring (which is generally the initial stage), followed by “compliance” monitoring (if and when groundwater contamination is confirmed), followed by “corrective action” monitoring (when the contamination exceeds established groundwater protection standards and remediation is required). When proposing a groundwater monitoring program for approval (in a closure plan or Part	

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B application) it must be designed for <u>only one</u> program. In most all cases, moving from one monitoring program to another (such as from detection monitoring to compliance monitoring) will require a permit modification or a revision to the closure plan. **E-6** **<u>Detection Monitoring Program</u>** 401 KAR 34:060 Section 9 Note: Except for case-by-case issues, all of the General Groundwater Monitoring Requirements (E-5 of this checklist) and Sections E-2 and E-3 of this checklist will be applicable for detection monitoring • Propose to monitor for those specific regulated hazardous constituents and reaction products which are associated with the unit. Indicator parameters may also be used. **The following contingency language must be specified to address what the facility must do if there is statistically significant evidence of contamination at the point of compliance:** • Notify the Cabinet within seven days and immediately sample all wells for the constituents in 401 KAR 34:360 (Equivalent to Federal Appendix IX). • Specify that the Appendix IX sampling will form the basis for selecting the compliance monitoring constituents, if required. The facility has the option to reevaluate the data by resampling for the compounds detected within one month. • Specify that a permit modification will be submitted within ninety days to establish a compliance monitoring program. • Specify that an Engineering Feasibility Plan for a corrective action program will be submitted within 180 days, unless all constituents are below their groundwater protection standard. Facility may pursue alternate concentration limits (ACLs). Note: the Engineering Feasibility Plan must contain all the details on the groundwater remediation system. • Specify the option to notify the Cabinet within seven days of determining the evidence of contamination to make a demonstration that a source other than the regulated unit caused the contamination or that the detection is an artifact caused by error. Also, specify that the demonstration will be submitted within ninety days or that the permit will be modified to revise the detection monitoring program. • Specify that if the facility determines that they no longer meet the requirements of the detection monitoring program, they must submit a permit modification within ninety days (generally to move into compliance monitoring).	

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E-7 **<u>Compliance Monitoring Program</u>** 401 KAR 34:060 Section 10 Note: Except for case-by-case issues, all of the General Groundwater Monitoring Requirements (E-5 of this checklist) and Sections E-2 and E-3 of this checklist must be applicable for compliance monitoring. • Propose comparing results from the point of compliance to the established groundwater protection standards (MCLs, background or other risk based levels). 34:060, Section 3. • Propose to analyze all wells at the point of compliance for all the constituents contained in 401 KAR 34:360 (Appendix IX) at least annually. • Specify the option to resample within one month if additional constituents are identified. Specify that the facility will notify the Cabinet within seven days if confirmed and propose to add detected constituents to the monitoring list. Specify that the facility must otherwise, report detections within seven days after completion of the initial analysis and to add constituents to the monitoring list. • Specify that the facility will notify the Cabinet within seven days if any of the parameters are above their respective standard and to submit an application for a permit modification to establish a corrective action program within 180 days or within ninety days if an Engineering Feasibility Plan has already been submitted. • Specify the option to demonstrate that a source other than the regulated unit caused the contamination or that the detection is an artifact caused by error. Specify that the facility will notify the Cabinet within seven days and a report within ninety days if making such a demonstration. • Specify that if the facility determines that they no longer meet the requirements of the compliance monitoring program they must submit an application for a permit modification within ninety days (generally to move to corrective action monitoring)	
E-8 **<u>Corrective Action Program</u>** 401 KAR 34:060 Section 11 Note: Except for case-by-case issues, all of the General Groundwater Monitoring Requirements (E-5 of this checklist) and Sections E-2, E-3 and E-4 of this checklist will be applicable for corrective action monitoring. However, the statistical evaluations may only be warranted when the facility is proposing to terminate all or part of the corrective action program. • Identify the Appendix IX constituents (and the levels) that are being detected and their groundwater protection standards. 34:060, Section 3.	

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• Specify a schedule for implementing corrective action within a reasonable time after a groundwater protection standard has been exceeded. • Specify how the effectiveness of the program will be measured. The program may be based on compliance monitoring and must be as effective in determining compliance. • Propose to remove or treat in place any Appendix IX constituents exceeding their groundwater protection standard between the compliance point and the property boundary and beyond the property boundary where necessary. • Specify that the corrective action will be terminated upon approval once all constituents are below their groundwater protection standard. • Specify that corrective action will continue even beyond the compliance monitoring period, if warranted. • Specify that the corrective action program may be terminated if the groundwater protection standard has not been exceeded for three consecutive years. • Propose to submit written reports showing the effectiveness of the program at least semiannually. • Specify that if the facility determines that they no longer meet the requirements of the corrective action program they must submit an application for a permit modification within ninety days (generally to return to either compliance or detection monitoring). **********	
E-9 **<u>Corrective Action For SWMUs And AOCs</u>** 401 KAR 34:060 Section 12 Any facility seeking a permit or closing a TSD unit must conduct "corrective action" if necessary to protect human health and the environment for releases of hazardous waste or constituents from any waste management units at the facility. These additional units (that are not TSD units) are identified in the RCRA Facility Assessment (RFA), which is prepared by the Division or by U.S. EPA. They are referred to as "solid waste management units" (SWMUs) or "areas of concern" (AOCs). In regard to corrective action at SWMUs, the Part B permits generally need only to include the following: • The recommendations in the RFA (if it has been finalized) • A map showing the location of the SWMUs and AOCs. • A schedule for submitting the RCRA Facility Investigation (RFI) Workplan (if there were any units identified in the RFA as requiring such).	

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• A brief overview of the corrective action process, wherein the general concepts of the RCRA Facility Investigation (RFI), Interim Measures (IM), Corrective Measures Study (CMS) and Corrective Measures Implementation (CMI) are identified (see the four volume "Interim Final - RCRA Facility Investigation RFI Guidance" dated May 1989, EPA 530/SW-89-031; the "Interim Final - RCRA Corrective Action Plan" dated June 1988, EPA/530-SW-88-028 and the "Interim Final - RCRA Corrective Action Interim Measures Guidance" dated June 1988, EPA/530-SW-88-029).	